

Claims

1. A magnetoelectric device responsive to an applied magnetic field, comprising first and second ferromagnetic regions with a channel region between them, the
5 ferromagnetic regions being configured so that charge carriers with a particular spin polarisation which can pass through the first region, pass through the second region as a function of the relative orientations of magnetisation of the ferromagnetic regions produced by the applied magnetic field whereby the device exhibits a conductivity as a function of the strength of the applied field, the channel region
10 being configured to provide a quasi-one-dimensional channel to cause charge carriers which pass through the first ferromagnetic region to maintain their spin polarisation as they pass towards the second ferromagnetic region.
2. A magnetoelectric device according to claim 1 wherein the channel region includes a nanotube.
- 15 3. A magnetoelectric device according to claim 2 wherein the channel region comprises a bundle of nanotubes.
4. A magnetoelectric device according to claim 2 wherein the ~~or each~~ nanotube
is made of carbon. *JMD*
5. A magnetoelectric device according to claim 1 wherein the channel region
20 includes a layer of carbon containing material.
6. A magnetoelectric device according to claim 3 wherein the channel region comprises a layer of graphite.
7. A magnetoelectric device according to claim 3 wherein the channel region comprises a diamond layer.
- 25 8. A magnetoelectric device responsive to an applied magnetic field, comprising first and second ferromagnetic regions with a channel region between them, wherein the channel region includes a carbon containing material.

9. A magnetoelectric device according to claim 8 wherein the channel region includes a carbon nanotube.
10. A magnetoelectric device according to claim 9 wherein the channel region comprises a bundle of nanotubes.
- 5 11. A magnetoelectric device according to claim 8 wherein the channel region comprises a layer of graphite.
12. A magnetoelectric device according to claim 8 wherein the channel region comprises a diamond layer.
13. A magnetoelectric device responsive to an applied magnetic field, comprising
10 first and second ferromagnetic regions with a channel region between them wherein the channel region includes a nanotube.
14. A magnetoelectric device according to claim 13 wherein the channel region comprises a bundle of nanotubes.
- 15 15. A magnetoelectric device according to claim 13 wherein the nanotube is made of carbon.
16. A magnetoelectric device according to claim 13 wherein the nanotube is formed of boron nitride.
17. A magnetoelectric device according to claim 13 wherein the nanotube is formed of silicon.
- 20 18. A magnetoelectric device according to claim 1 wherein the first and second ferromagnetic regions comprise layers on a common substrate.
19. A magnetoelectric device according to claim 18 wherein the substrate^{is} made of a material selected from a group consisting of a metal, glass and silicon, and covered with an insulating layer on which the ferromagnetic layers are formed.

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22. A magnetoelectric device according to claim 1 including a gate to apply a field to the channel region.

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